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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,184	06/05/2001	Stephen William Colley	KPT 1092	5402

7590

05/16/2003

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Senniger Powers Leavitt & Roedel
One Metropolitan Square
16th Floor
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EXAMINER

TUCKER, ZACHARY C

ART UNIT

PAPER NUMBER

1624

DATE MAILED: 05/16/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.



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Office Action Summary

Application No.

09/806,184

Applicant(s)

COLLEY ET AL.

Examiner

Zachary C. Tucker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9 and 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Lack of Unity of Invention

In view of the amendment to claim 1, which now requires compounds in the effluent from the ethyl acetate production zone containing carbonyl groups to be reduced to the corresponding alcohols in the selective hydrogenation step, the holding of Lack of Unity of Invention, first stated in the Office action of 7 May 2002, is hereby withdrawn. Applicant has acknowledged that the special technical feature of the instantly claimed invention is the selective hydrogenation step (c) in claim 1 (page 4 of the response filed 10 February 2003).

The Grootendorst et al reference does not disclose selective hydrogenation of the carbonyl-containing compound acetic acid to an alcohol.

Status of

Claim Rejections - 35 USC § 112

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The previously stated rejection of claims 1-29 under 35 U.S.C. 112, second paragraph, is withdrawn in view of the amendments to claims 1, 3, 4, 7 and 18, and also in view of applicant's arguments.

Claim 1 was found to be indefinite because the what the "selective hydrogenation conditions" are selective for, and the actual conditions themselves in step (c), have not been specified in the claim. Applicant's reply, specifically the statement that these conditions are readily ascertained by those of ordinary skill in the art (page 5 of the

response filed 10 February 2003), is persuasive, and the rejection of claim 1 under 35 U.S.C. 112, second paragraph is withdrawn.

The objectionable claim language which was grounds for rejection of claims 3, 4, 7 and 18 under this statute has been removed by the present amendment.

Status of

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The process of claims 1-29 is finally rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,027,182 (Lazier), for reasons of record in the previous Office action, and further for reasons given hereinbelow:

The crux of applicant's rebuttal to the rejection based on the Lazier patent is that Lazier's hydrogenation step is not performed on the effluent from the dehydrogenation of a C₂ feedstock comprising ethanol, but instead on crude higher alcohols which have been separated from said effluent. Therefore, applicant has concluded, Lazier does not subject an ethyl acetate and ethanol-containing fraction to the hydrogenation step.

Applicant has not responded to the argument that some ethyl acetate would necessarily be present in the crude higher alcohol fraction (which is a portion of the intermediate reaction product mixture as specified in step (b) of instant claim 1) obtained from the dehydrogenation effluent in Lazier's process, due to the fact that only a rough separation of products is effected, and since this is the fraction subjected to the hydrogenation step, the effluent from Lazier's hydrogenation step also comprises some

of the same low-boiling material found in the low-boiling fraction of Lazier. Thus, step (d) in instant claim 1 is part of the Lazier disclosure.

The excerpt from Kirk-Othmer was relied upon to show that multi-component distillations require many more distillation steps than are disclosed in the Lazier patent to completely separate all of the ethyl acetate from the "crude higher alcohol fraction" boiling at 90-130°C.

Because materials in the selectively hydrogenated product mixture are also present in Lazier's fraction boiling under 90°C, the limitation of step (e) is met, whether or not material of the selectively hydrogenated product mixture is present all in one fraction or more than one fraction, as it is in Lazier's process. Because Lazier effects only a rough separation of the components of the dehydrogenation of ethanol, the light fraction wherein most of the ethyl acetate thusly produced resides is comprised of some of the same material as the next higher boiling fraction, which, when distilled to produce substantially pure ethyl acetate, as would be obvious to one of ordinary skill in the art, meets step (e) of claim 1. Some of the same material present in Lazier's hydrogenated product mixture (the 90-130°C fraction) is also present in Lazier's "under 90°C fraction," in which the majority of ethyl acetate produced resides.

Lazier's dehydrogenation effluent contains crotonaldehyde in addition to crotyl alcohol, as was pointed out in the previous Office action. This crotonaldehyde is present in the fraction subjected to the hydrogenation step. The instant specification, on page 10 to page 11, states that crotonaldehyde is one of the by-products in a process for making ethyl acetate by dehydrogenation of ethanol in the presence of a copper-

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containing catalyst, which is the same process disclosed by Lazier. Any crotyl alcohol present in Lazier's process would necessarily have to have been formed by way of crotonaldehyde. In Example 1 of Lazier, crotonaldehyde is a component of the mixture which is hydrogenated in the presence of catalyst comprising platinum, producing *n*-butanol. The "crude synthetic butanol" which is hydrogenated in this example is a component of the reaction product mixture from the dehydrogenation of ethanol, and a component of the 90-130°C fraction which is hydrogenated in the process as it is disclosed in the left-hand column of page 2 of Lazier. The boiling point of crotonaldehyde is 104°C, from The Merck Index, 13th ed.

Lazier's crude reaction product mixture, according to the disclosure of that patent (Example 1) and applicant's own disclosure (pages 10-11), which describes a process along the lines of that disclosed in the Lazier patent, state that crotonaldehyde is present in the reaction product mixture. In the Lazier patent, this crotonaldehyde is reduced to *n*-butanol. This meets the definition of selective hydrogenation, as set forth in claim 1, step (c).

Pressures, mole ratios and temperatures specified in dependent claims all are within the ranges disclosed in the Lazier patent. Any process variables not disclosed in Lazier (such as LHSV) represent engineering expedients which cannot serve as the sole basis for patentability of the claimed process. Discovering a workable range where the general conditions of a process are disclosed in the prior art is obvious to one of ordinary skill.

As was stated in the previous Office action, the principal deficiency of Lazier is the lack of a step wherein ethanol in the reaction mixture from the dehydrogenation of ethanol is recovered by distillation, and separated from ethyl acetate. It is obvious to recover the product made by a process in pure form, and it is also obvious to recover unreacted starting material so that it may be recycled.

The process of claims 1-29 in their present form would have been obvious to one of ordinary skill in the art at the time the invention was made, given the teachings of the Lazier patent.

Comments

The following are intended to assist applicant in furthering the prosecution of the prosecution of the application:

The word "reactive" before carbonyl, begs the question, "which carbonyl groups are unreactive?" In the process for making ethyl acetate from a C₂ feedstock comprising ethanol, the carbonyl groups which could be present in the product mixture are aldehyde, ketone and carboxylic acid carbonyls. Applicant, however, opines that a carboxylic acid group contains no carbonyl moiety, leaving aldehyde and ketone carbonyl groups. Thus, all carbonyl groups present in the reaction product mixture are reactive, making the characterization "reactive carbonyl groups" superfluous at best.

The process of claim 1 is not specified in a manner that requires each and every step to be conducted sequentially. This is part of the reason that the rejection over Lazier has been maintained. Applicant's arguments seem to imply that he believes the claims specify steps in the process must be conducted sequentially. However, the

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phrase "material of" referring to a previous step does not absolutely require that the effluent from the process step that the phrase refers to be the material subjected to the process step in which the phrase appears. The phrase "material of" merely requires that some of the same material present in the process step to which it refers also be present in the process step in which the phrase appears.

At least as far as the Lazier patent is concerned, the rejection could be overcome by specifying that the steps are conducted sequentially (with language specifying that manipulations of the process are performed on 'the effluent from' a previous step instead of on the "material of" another step), and that the selective hydrogenation step is performed on the fraction of the reaction product mixture comprising the majority of the ethyl acetate produced. Lazier's hydrogenation mixture comprises only *some* ethyl acetate and ethanol in combination with crotonaldehyde, which is hydrogenated to *n*-butanol.

There are no examples in the instant specification demonstrating the process wherein any of (ii), (iii) or (iv) in claim 1. Only production of ethyl acetate by dehydrogenation of ethanol is demonstrated.

Specification

The previously stated rejection to the specification is withdrawn in view of the amendment introducing a heading for the Brief Description of the Drawings.

Information Disclosure Statement

Items 13, 14, 18 and 21 cited on the PTO-1449 form submitted 21 October 2002 have not been considered, as they are not in the English language. English-language

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abstracts have been considered for items 13 and 18, which abstracts were cited separately on the PTO-1449 form.

Item 14 is in Russian, with only a Russian-language abstract. Item 21 is in Portugese, and does not appear to relate in any way to the invention claimed in the instant application.

Conclusion

Any inquiry concerning this communication should be directed to Zachary Tucker whose telephone number is (703) 305-2050. The examiner can normally be reached Monday-Friday from 7:00am to 3:30pm. If Attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mukund Shah, can be reached at (703) 308-4716. The fax number for the organization where this application or proceeding is assigned is (703) 308-4556 for regular communications and (703) 308-4242 for after-final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

zt



Mukund Shah
Supervisory Patent Examiner
Art Unit 1624